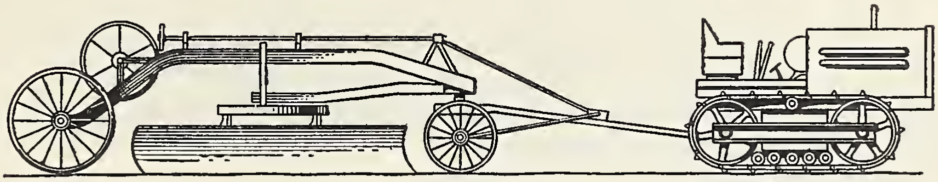
CONSTRUCTION



HINTS

UNITED STATES DEPARTMENT OF AGRICULTURE, FOREST SERVICE
WASHINGTON, D.C.

Volume 5. September, 1939 No. 7

The Washington Office of Engineering to date has issued maintenance standards for Chevrolet trucks, lubrication and batteries and Reo trucks. The three major reasons for the issuance of these standards are given by Mr. O. Wiederhold on page 2.

A typographical error was made on page C-4 of these standards. Part 10, Section (a) now reads in part as follows: "---- or more than 1/6" individually". This should be changed to read, "---- or more than 1/16" individually".

On page 3 will be found the answer supplied by Mr. Wiederhold as to why standards have not been set up for oil changes. Following this is included a reprint of a portion of Circular Letter LC-556, issued by the National Bureau of Standards, in regard to automotive brake lining. As space permits, Construction Hints will carry additional reprints from this letter.

Enrollee P. Speliotis of Camp S-56, Connecticut, has designed and constructed the tool rack shown on page 7. The camp feels much credit is due Mr. Speliotis, and a drawing of this rack is shown herein for the benefit of other States and Forests.

On page 8 is shown a design by the Soil Conservation Service of collapsible pickup seats, bows and steps. That Bureau has given its permission for its publication, feeling that it may be of benefit to you.

E. S. Massie, Jr.
Editor

MAINTENANCE STANDARDS

The Washington Office of Engineering has issued to date four groups of equipment maintenance standards and more will follow within the next few months.

These standards are being developed for three major reasons, namely:

1. To obtain a greater amount of work from equipment at a lesser operating cost through the exercising of more and better preventative maintenance.

2. To base camp equipment inspections on a common standard irrespective of whether the inspector represents the Washington Office, Director's Office or Regional office.

3. To insure the camp's receiving their money's worth when overhauls or repairs are made by the Central Repair Shops.

To secure these objectives a period of time will naturally be required. In this respect suggestions from the field relative to improving or changing particular standards not only will be welcome but are solicited.

We in Engineering want the plan to work and as effectively as possible, due consideration being given to the wide scope of CCC operations. To secure this objective cooperation from the operating forces in the field is essential.

To date certain misinterpretations have been apparent. The first of these refers to page A-4, Section 13, part (b). This standard was intended to cover side wall cuts only, and it does not refer to cuts on the tread, which, however, should naturally be plugged or vulcanized if of sufficient size. It was felt that there exists a much greater potential danger from blowouts through side wall cuts than tread cuts of equal size.

In one instance camps were found to be completely discarding tires that had tread cuts. This was not the intent of this standard.

Suggestions have also been made that the standard be changed so that tires with side wall cuts can be used on the outer dual wheel.

In this respect, the inner mounting was specified because it was felt that tires with side wall cuts could be better protected from further abrasion if mounted on the inner dual wheel. It is admitted that this reasoning is open to argument from many directions and if sufficient additional requests are received, the standard as now written will be revised.

Criticism has been general relative to the generous requirements set up by the Chevrolet "Safety and Performance" standard. This procedure was followed as an initial step to permit the camps whose equipment is now below these standards, (and there are many of these) to catch up, after which a tighter revision will be issued.

O. Wiederhold.

OIL CHANGE STANDARDS

Requests have been received for clarification of the oil change requirements, page A-2, part 5 and C-2, part 5. No standard has been set up covering oil changes on trucks not equipped with replaceable element filters, or equipped with the small "tomato-can" type.

It appears that most of the Regions are changing filters to the replaceable element type. Likewise, practically all trucks now being purchased will be equipped with similar types when they leave the factories.

For this reason it was decided not to set up any standard for oil changes on engines equipped with the "tomato-can" type since these represent only a small minority.

AUTOMOTIVE BRAKE LINING

Reprint from Bureau of Standards
Circular Letter LC-556

I. INTRODUCTION

This letter circular has been prepared to give the consumer general information regarding the brakes of an automobile and to show the characteristics which brake linings should have in order that the brakes may operate safely, uniformly, and efficiently. The modern brakes are so complex that no single lining is the best for all purposes; in fact a single brake may require two different types of lining in different positions. Linings should be selected so as to have a coefficient of friction suitable for the particular brake and place in the brake in which they are to be used. Furthermore, they should maintain these frictional characteristics under all ordinary operating conditions, so that the same pedal pressure may produce the same deceleration regardless of the temperature, the presence of or absence of moisture, the age of the lining, or other circumstances. While wear is no longer the major problem it once was, the rate of wear should obviously be kept as low as may be consistent with satisfactory performance since the cost of replacing worn linings and the attendant loss of use of the vehicle represent a much greater expense than the actual cost of the material.

The stopping of a car is limited, in the final analysis, by the coefficient of friction between the tires and the road surface. Brakes can retard the action of the wheels up to the point where they slide on the road, but beyond this they can have no effect. Assuming a coefficient of friction between the tires and the road of 0.8, which is close to the upper limit, a car can lose speed at the rate of 25 ft. per second per second, or in more familiar terms, about 17 miles per hour per second. Thus, from a speed of 34 miles per hour it could be stopped in about two seconds. Under average conditions the coefficient of friction

will be less than 0.8 and the possible retardation correspondingly less. In any case, it should be possible for the driver to control the retardation easily and the pedal force required should be within reasonable limits.

II TYPES OF BRAKES

Prior to 1925 most brakes on automobiles were of the external contracting type. These brakes are still used to some extent, especially for shaft or parking brakes, but the internal expanding brake has replaced the external type for most uses. The internal brake is more compact and can be better protected from dirt and water than the external brake. However, it does require that more attention be given to the characteristics of the brake lining used, especially with drums of small diameter.

There are many different kinds of internal brake mechanisms. All of them employ sections of lining riveted or bolted to bands or shoes mounted in various ways so that the lining may be forced against the drum surface. The shoes may be actuated by some mechanical means, or by the use of a hydraulic cylinder. There are some differences in the way in which a brake operates, depending on whether it is mechanical or hydraulic, but for purposes of this discussion it is simply considered that forces are applied to the shoes or bands by some appropriate means.

Figures 1 to 4 illustrate some typical brake mechanisms and show the way in which the braking forces act in retarding the movement of the brake drum and in turn of the automobile. Parts which are unessential from the standpoint of braking action, such as retracting springs and means for adjustment, have been omitted.

All brake mechanisms illustrated are designed so that they are self-energizing to some degree in that rotation of the brake drum while the brake is applied affects the pressure between the lining and the drum. The energization is not the same for all brakes nor for different shoes in any one brake. The object of energization is to make less effort necessary in applying the brakes without loss in braking ability. Due to energization many brakes perform differently depending on whether the car is moving in the forward or the backward direction.

The energization is due to the frictional force of the brake drum on the brake lining. This force when considered in connection with any one shoe may tend to force it either toward or away from the drum and will have the effect of either adding to or subtracting from the force (F) shown in the figures. The amount of energization has an important bearing on the selection of the most suitable lining for a particular brake shoe.

The features to be noted in the brake mechanisms shown in figures 1 to 4 are

(1) Location of the anchor pin;

(2) The connections, if any, between shoes;

(3) The layout of any linkages used.

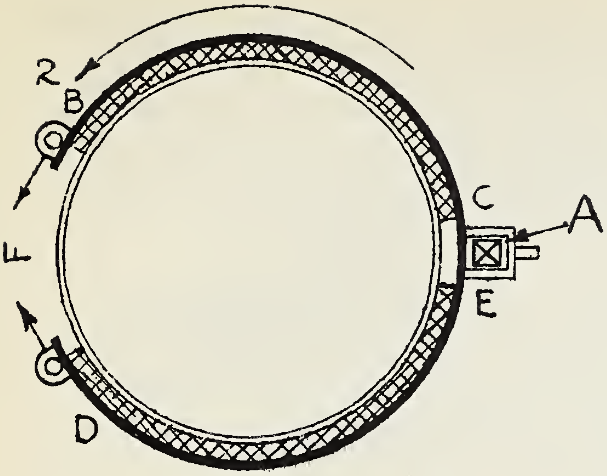


Fig 1

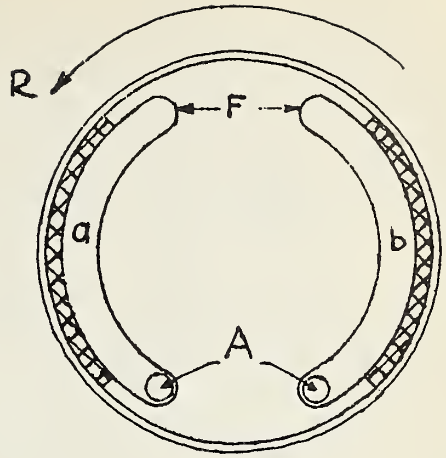


Fig 2

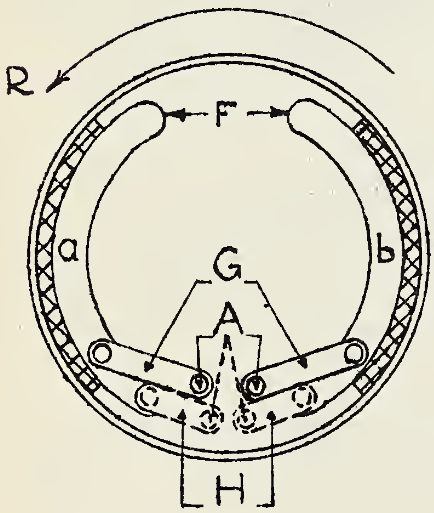


Fig 3

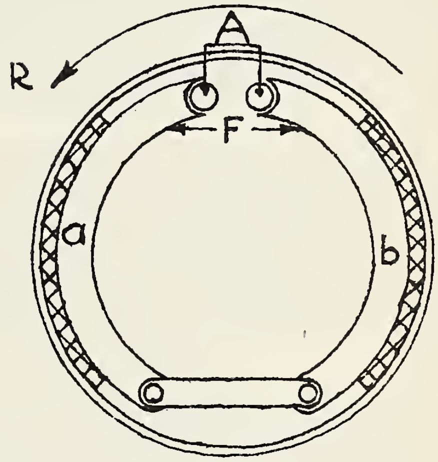


Fig 4

TYPICAL BRAKE MECHANISMS

Legend

R - Forward direction of drum rotation
F - Point of force application
A - Anchor pins

Referring to figure 1, the forces (F) act at the ends of the bands and as the drum turns frictional forces are set up which tend to force the top half of the lining toward the drum and the lower half away from the drum. Thus, it will be found that forces normal to the drum and hence the retarding forces vary along the length of the band from a high value at point C to a low value at E with intermediate values at B and D. By locating the anchor pin at other positions on the circumference of the band, the relative values of these forces can be changed.

Figure 2 illustrates a simple type of internal brake mechanism. The shoes are rigid; both are anchored at A and forces are applied at F to bring the lining in contact with the drum. Shoe (a) is energized inasmuch as frictional forces tend to force it toward the drum. Shoe (b) is de-energized inasmuch as frictional forces tend to force it away from the drum. The amount of energization depends on the location of the anchors relative to the braking surface.

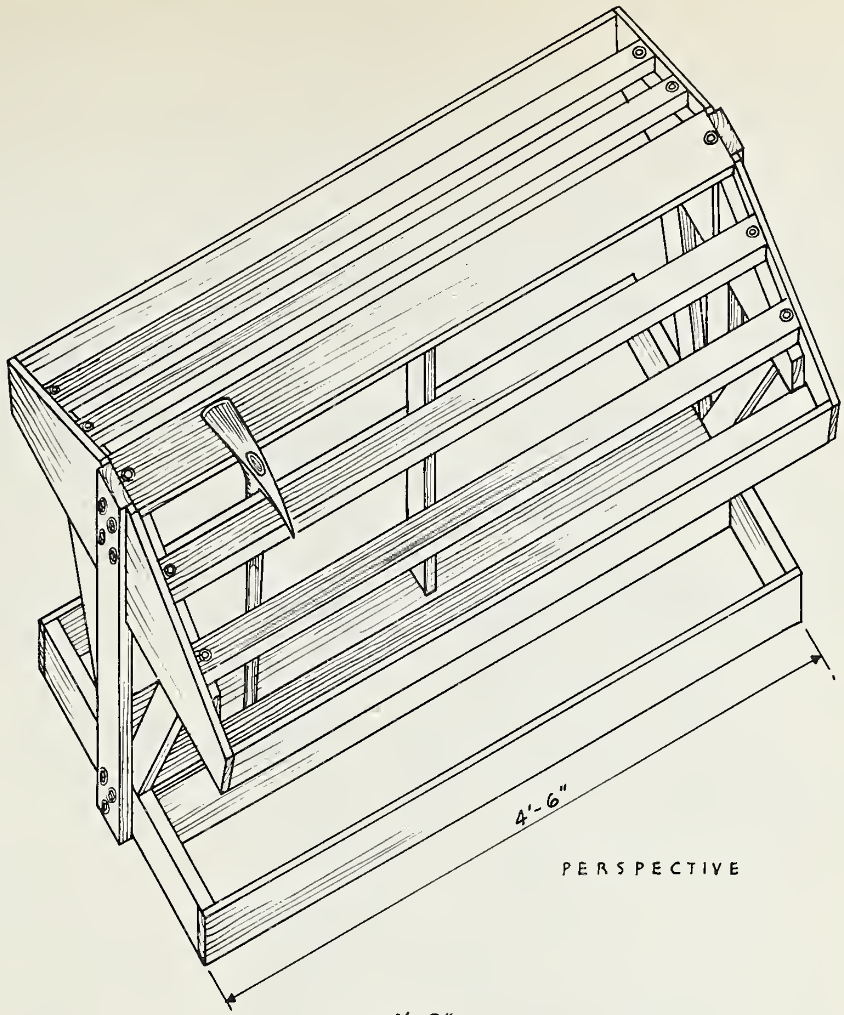
Figure 3 illustrates a brake similar to figure 2 except that links are used to connect the shoes to fixed anchors, thus allowing the shoes more freedom to adjust themselves to the drum. Energization can be varied considerably by different arrangements of the linkages and the anchor pins. Two arrangements are indicated in the figure. If links are placed as shown at (G) the energization on shoe (a) and the de-energization on shoe (b) will be greater than if they are placed at (H). In the brakes shown in figures 2 and 3 it will be noted that each shoe operates independently.

In figure 4 the two shoes are connected by a link at the bottom and anchors are provided at the top. In this brake energization takes place to some extent in shoe (a) because shoe (b) acts as an anchor. Shoe (b) is also energized on account of the direction of rotation and the location of the anchor. Also, there is an additional effect in that the force on the end of shoe (b) is dependent on the total frictional force of shoe (a).

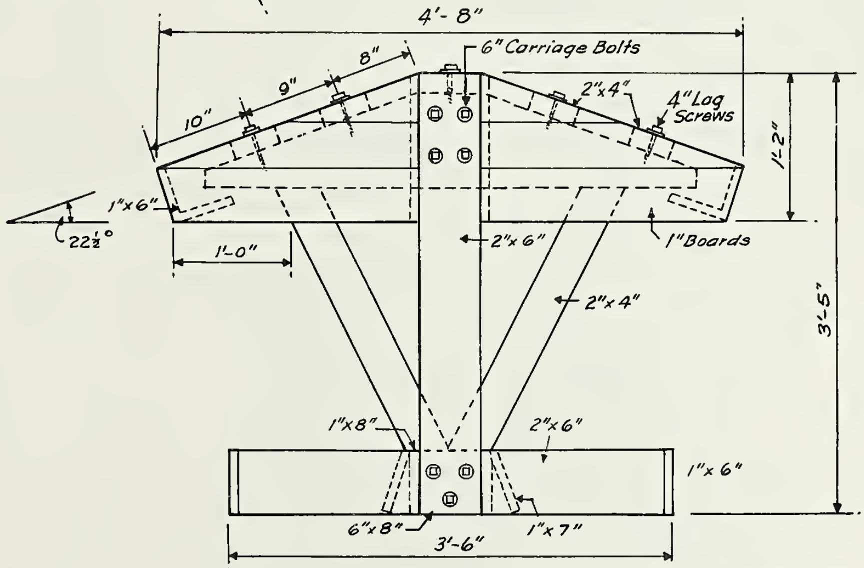
There are many modifications of these brakes. Shoes of different types or of different lengths are often employed in the same brake. Sometimes a flexible band is substituted for one or both of the shoes. Three or four shoes are sometimes employed in the same brake, but the two-shoe brake, with rigid shoes, is the most common type.

As a result of the energization of brakes it will be evident that although the lining operates inside a smooth cylindrical drum and presses against a large part of the drum surface, there is far from uniform braking action along the lining. One lining, or a portion of one lining, may do a major part of the work.

The figures showing brake mechanisms and the statements made relative to their action are all based on the movement of the car in the forward direction. Brakes are also required when a car moves in the reverse direction, but in most cases a less efficient brake is satisfactory for backward motion, and the effectiveness may be sacrificed for better operation in the forward direction.



PERSPECTIVE

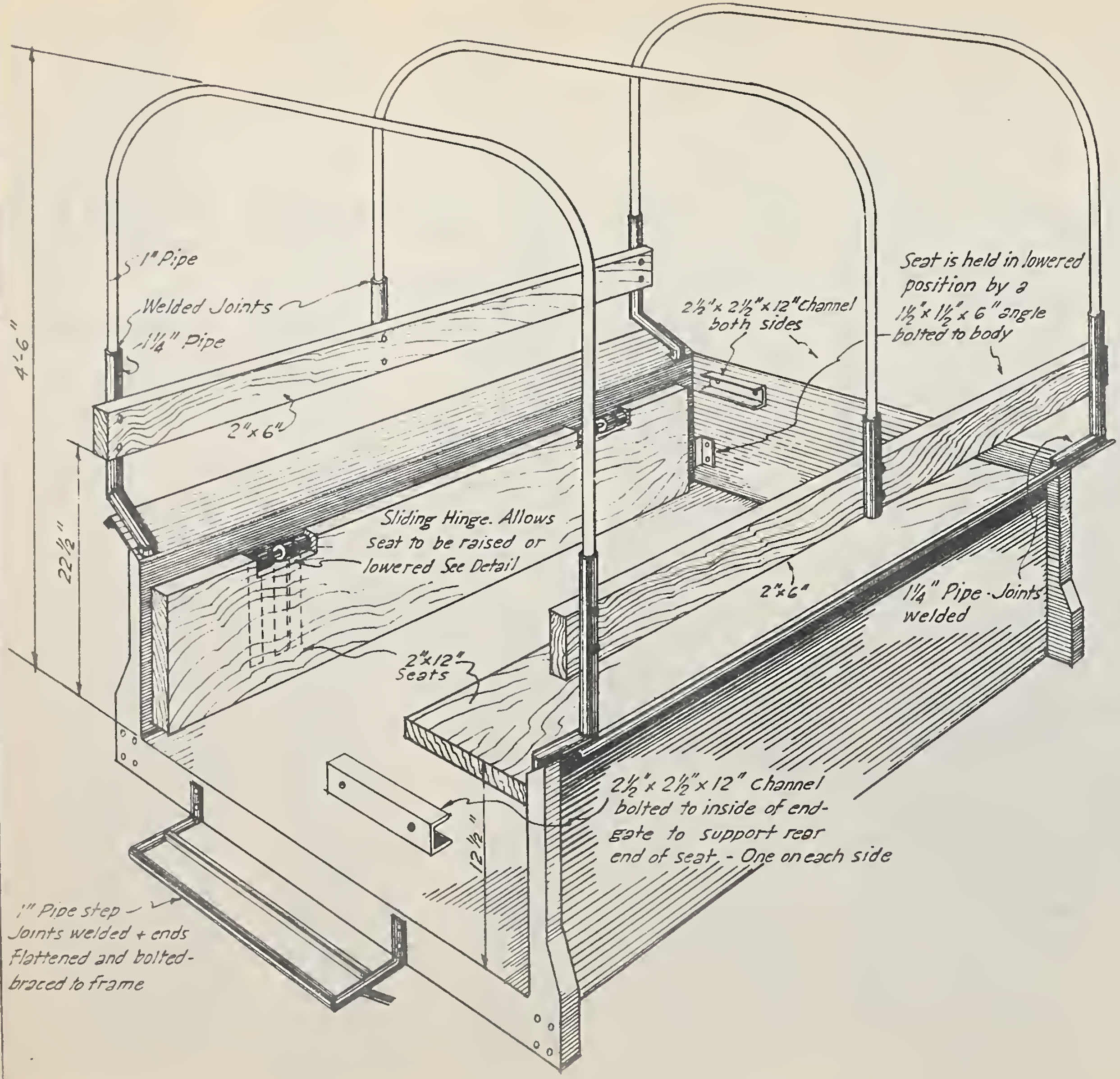


END VIEW

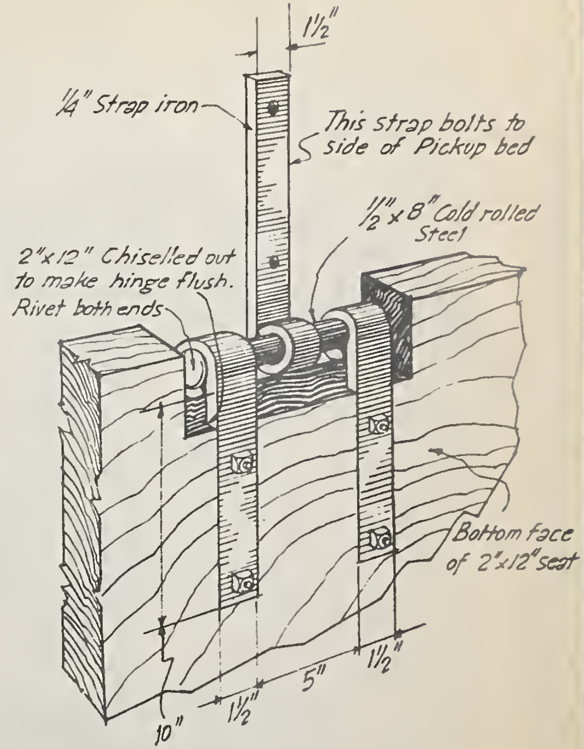
COMBINATION TOOL RACK

CAMP HADLEY S-56

Designed by P. Spelotis



PERSPECTIVE OF PICKUP BED - Endgate Removed
Showing seat arrangement, bows and steps.



DETAIL OF SLIDING HINGE

The hinge is bolted by the single strap to the pickup bed, allowing the seat to slide back and forth on the ½" Pin.

COLLAPSIBLE PICKUP SEATS, BOWS & STEPS				
REGION NO. 4	FT. WORTH, TEXAS			
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE H. H. BENNETT-CHIEF				
REFERENCE FROM DESIGN BY SCS-CCC 3BT FLORESVILLE TEXAS				
DRAFTING APPROVAL C. B. Eason			TECHNICAL APPROVAL	
COMPILED G.L.B.	TRACED G.L.B.	CHECKED A.R.R.	DATE 7-2-39	4-N-144